ARIZONA DEPARTMENT OF WATER RESOURCES

Phoenix Active Management Area

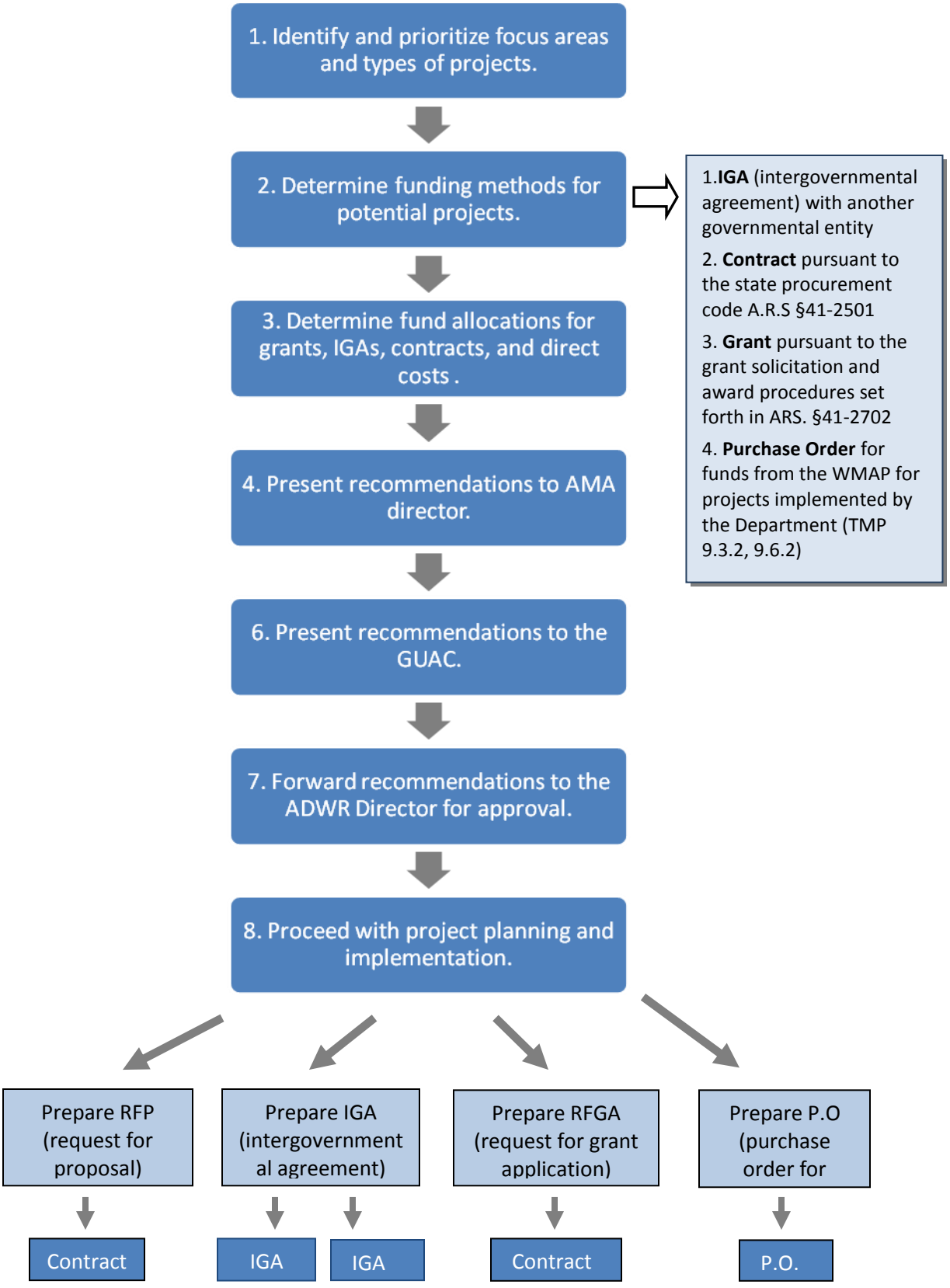
Water Management Assistance Program (WMAP) Summary of Funded Projects and Grants: 1992 – 2010

The Water Management Assistance Program is intended to provide financial and technical assistance and to assist in the development and implementation of:

- *conservation programs,*
- *augmentation programs, and*
- *programs designed to monitor hydrologic conditions and assess water availability*

*in the Active Management Area. (*Third Management Plan. 9.1)

Water Management Assistance Program (WMAP)
Current Process for Funding Projects



Phoenix AMA WMAP Funded Projects and Grants: Summary of Projects 1992 – 2010
(This list may be incomplete and is subject to updates)

Augmentation and Recharge				
1994	City of Avondale	Avondale Wetlands Nursery	Native plants from the Avondale Wastewater Treatment Plant discharge area were monitored to assess the potential of the City to raise its own plant material for their wetland treatment and recharge system.	$10,000
1994	Town of Gilbert	Recharge into Vadose Zone Injection Well	The feasibility of recharging reclaimed wastewater into a vadose zone injection well (VZIW) in the vicinity of the Town's treatment plant was determined and its performance monitored compared to infiltration spreading basins.	$51,500
1994	City of Mesa	Queen Creek Wash Recharge Study	This grant helped fund the completion of a hydrologic feasibility study for storing water underground at the proposed Queen Creek Wash Underground Storage and Recovery Project. The study concluded that approximately 10,000 acre-feet of water could be recharged based on the size and conditions of the proposed recharge project site.	$21,000
1994	City of Surprise	CAP and Effluent Recharge Study Optimal Operation and Maintenance for Recharge Basins with Fine-Grained Soils	Research conducted on the recharge capabilities of two spreading basin sites in the City-- an effluent site at the waste water treatment plant and a CAP site at McMicken Dam-- demonstrated that recharge at both sites would be hydrologically feasible for a large-scale project. The results enabled the City to begin the design and permitting processes needed for full-scale recharge facilities.	$105,500 $200,000
1994	Waddel Dam, Lake Pleasant	Waddel Dam CAP Recharge Study	This study tested the feasibility of recharging the aquifer with CAP water in the Agua Fria River basin downstream of Lake Pleasant, developed a recharge plan, and enhanced riparian wildlife habitat along the river below Lake Pleasant.	$30,910
1994	Arizona State University	High Quality Recharge Study	This project studied the release of contaminants in the vadose zone from potentially corrosive source waters during groundwater recharge. The interactions of soil minerals with reverse osmosis-treated water, micro-filtered water, CAP water and specific blends of these waters were compared.	$56,797
1994	Arizona State University	Mobile Water Treatment/Recharge Center	This project studied the development of a cost-effective, portable system for filtering and improving the quality of raw water (such as runoff from the Salt and Verde rivers and CAP water) which could then be used for recharge.	$88,364
1994	Arizona State University	Soil Aquifer Treatment Optimization Study	A methodology was developed for determining the optimal operation of soil aquifer treatment (SAT) systems to maximize infiltration under different constraints.	$57,659
1994 1995	City of Chandler	Recharge: Injection Wells	project included a pilot injection well (to recharge 3,100 acre-feet of effluent per year at full-scale), construction and monitoring of three injection wells for reverse osmosis- treated effluent at Chandler Effluent Treatment and Recharge Facility.	$50,000 $150,000
1994 1997	University of Arizona	Dairy Wastewater Treatment with Constructed Wetlands	An experimental wetland facility was constructed to treat wastewater generated by a Valley dairy operation and assess the ability of this technology to produce water suitable for recharge and/or reuse in an environmentally sound manner.	$392,180 $159,138
1994 1997	City of Phoenix	Tres Rios Constructed Wetlands Study	This study tested the capability of constructed wetlands to upgrade the quality of treated sewage effluent from the 91st Avenue Wastewater Treatment Plant to levels that would satisfy National Pollutant Discharge Elimination Permit requirements.	$150,000 $40,500
1995	City of Goodyear	Recharge and Reuse of Treated Effluent	An infrastructure master plan was developed to utilize and recharge up to 21 million gallons per day of treated effluent produced at the Goodyear Wastewater Treatment Plant.	$75,330

Augmentation and Recharge				
1995	City of Goodyear	CAP Groundwater Treatment Facility	This study identified design criteria for a treatment plant capable of treating both surface and groundwater in the same facility, and determined the feasibility of treating CAP water and high TDS groundwater in a conventional water treatment plant.	$124,800
1995	Arizona State University	Iron-induced Aquifer Treatment to Improve Water Quality	This study determined if elemental iron is effective in dechlorinating certain organo-chlorine compounds (significant groundwater contaminants) under laboratory conditions.	$24,470
1995	University of Arizona	Recharge Mounding Prevention Study	This project developed a method to improve the operation of percolation recharge systems to avoid groundwater mounding problems. The project proposed to develop a methodology for determining the optimal infiltration application cycles and protective well pumping rates to maximize the overall economically feasible recharge rate.	$65,283
1995	Arizona State University	Well Maintenance Technology for Tertiary Effluent	This project determined if wells could be used to recharge effluent directly into water supply aquifers. The effectiveness of several disinfection schemes to control clogging were investigated, as well as the ability of the aquifer to break down potentially hazardous disinfection by-products.	$77,558
1995 1996	City of Goodyear	Feasibility of CAP Delivery and Recharge	The City studied the feasibility of recharging CAP water in the West Valley, including recharge alternatives and the establishment of a direct CAP delivery system through the Beardsley Canal. A technical and hydrological study was conducted for the recharge of 120 acre-feet of CAP water.	$22,311 $117,689
1996	City of Avondale with Arizona State University	Recharge: Avondale Wetlands Study	A study was conducted on the City's nitrate treatment wetland-recharge demonstration project that was to ultimately utilize 35,000 acre-feet of water annually, including 5,000 acre-feet of CAP water. The wetlands would treat SRP canal water which often exceeds the maximum contaminant level for nitrate.	$212,000
1996	Town of Buckeye	Study to Supply High Quality Water to the Town of Buckeye	A water supply strategy was developed to reduce the Town's dependence on poor quality groundwater and reduce the cost of water to residents. The study was to identify sources which would be renewable, adequate to provide for future growth, of acceptable quality and available at a reasonable price.	$31,500
1996	WESTCAPS/City of Glendale	CAP Water Use	The grant assisted in funding a Water Resources Director position to coordinate planning efforts of the West Valley CAP Subcontractors' Coalition (WESTCAPS). The director would establish and implement a regional planning process to identify, develop, evaluate and recommend courses of action to facilitate the use of CAP water in the West Valley.	$150,000
1998	City of Chandler	Shallow Groundwater Management Strategies	A feasibility study looked at strategies to manage rising shallow, poor quality groundwater resulting from natural recharge, return flows and artificial recharge. An emphasis was on the reuse of shallow groundwater.	$75,000
1998	City of Phoenix	Cave Creek Water Reclamation Plant - Wetlands and Recharge	A system of unlined wetlands and recharge basins was designed in an urban area to treat and recharge effluent generated at the Cave Creek Water Reclamation Plant. The high quality reclaimed water was to be used for recreation, habitat enhancement and augmentation of water resources through recharge.	$50,000
1998	City of Surprise	Recharge Basins in Fine Grained Soils	A pilot study evaluated the various methods of recharge basin operation and maintenance and the effect of the methods on the long-term sustainability of infiltration rates in recharge	$200,000

Augmentation and Recharge				
			basins with fine grained soils. This study is a follow up to the 1994 project (above).	
2002	Sun City West	CAP Water to Sun City West Feasibility Study	A feasibility study was conducted for the Sun City West Property Owners Residents Assn.(PORA) to look at transporting and using CAP water for golf course irrigation. The project also included an education program for the community about the use of CAP water and conservation.	$48,600
2001	Town of Cave Creek	Cave Creek Water Supply Study	A water use and demand analysis of the Carefree/Cave Creek Basin focused on the Cave Creek water supply. It included a resource analysis of the western portion of the Basin, current and future water supplies, and recommendations for Cave Creek, Carefree, and northwest Scottsdale.	$79,349
				$2,917,438

Agriculture Irrigation Efficiency and Crop Water Use				
1992 1993 1995 1996 1997 1998 2003 2005 2007 2009 2010	Buckeye Valley NRCD	Water Conservation Management Program (WCMP)	The WCMP helps farmers and urban irrigation users in the east and west valley improve the efficiency of their irrigation programs. The 2005 agreement included assistance to agriculture BMP enrollees, field testing and evaluation by the USDA NRCS, and outreach by the UA Cooperative Extension. *Note: $80,000 for October 2011 – September 2012 was declined due to staffing issues*.	$187,665 $121191 $168,880 $88,228 $41,567 $191,262 $154,426 $167,121 $73,300 $154,500 $160,000 $80 000
1994	U.S. Water Conservation Laboratory, USDA/ARS	Software to Design Sloping Border Irrigation Systems	A software program was developed to aid in the design of sloping border irrigation systems with tail-water runoff.	$45,000
1995	University of Arizona	Water Use of Cotton	Researchers studied the quality, feasibility and consumptive water use of several short season cotton varieties and compared them to long season cotton.	$117,625
				$1,670,765

Municipal and Industrial Conservation Programs				
1992 1993	University of Arizona	Evaporative Cooler Water Use in the City of Phoenix	This study determined the average volume of water used by evaporative coolers with and without bleed-off systems; the percentage of t water used by the cooler as a portion of total household water use; and the ability of residential water meters to record the true volume of water utilized by coolers.	$40,000 $20,000
1992 1995 1997	AZ Dept. of Commerce Energy Office	Seniors Helping Seniors Program	This retrofit program included the free installation of fixtures in senior residences by seniors, energy and water conservation education, and provided social services if necessary.	$40,000 $37,500 $44,790
1993	City of El Mirage	Computer Tracking System and Education Program	The City's computer system was upgraded to more effectively track the water use of its citizens, and a program was developed to educate employees and citizens about the importance of water conservation.	$20,000
1994	City of Peoria	Retrofit Program	The City conducted a water conservation plumbing/retrofit program for 150 public housing units.	$4,000
1994 1995 1996	Phoenix Revitalization Corporation and Labor's Community Service Agenc	Phoenix Neighbors Helping Neighbors Program	This program promoted water conservation and helped residents in geographic areas with historic high-water use, economic hardship and a high level of criminal activity conserve water. It provided a catalyst and vehicle for neighborhood self-help and job training and employment opportunities for local residents, particularly youths at risk for gang involvement.	$45,000 $78,100 $48,541
1995	City of Surprise	Surprise Model Ordinances for Water Use Restrictions	Model water conservation ordinances and guidelines were developed by the City as it developed its water distribution system and service as a water provider.	$50,000
1995	Arizona Municipal Water Users Association (AMWUA	Technical Water Conservation Training for Industrial / Commercial	These grants funded workshops specifically geared to assist commercial and institutional facility managers with performing water audits of their facilities.	$6,200 $51,000
1995	City of Tempe	Tempe Industrial and Commercial Retrofit Incentive Program	To encourage industrial and commercial water users to implement water conservation measures, a rebate was offered for projects that anticipated a water savings of fifteen percent or more of the total water used.	$100,000
1995	University of Arizona Arid Land Studies	Outdoor Misting System Efficiency	This study investigated water usage and efficiency of outdoor misting systems, and disseminated findings to the public.	$18,797
1995 1997	City of Mesa	Mesa Multifamily Exterior-Interior Water Use Efficiency	This study looked at two multifamily sites (high and low water use) and identified water demand strategies that could improve their water efficiency. The project included a survey, interior and exterior audits, workshops for participants, recommendations, and cost benefit analyses. Site-specific water management strategies (retrofits, landscape conversion and education) were implemented in Phase 2.	$96,100 $186,470
1996	Arizona Municipal Water Users Assn.(AMWUA)	Residential End Use Study	This study measured water use in a residential setting, created a database, and provided a resource to evaluate existing conservation measures. Portable data loggers and sensors, and surveys helped determine water use for each purpose based on fixture age, volume and frequency of use, household size, age of home, lot size, landscape type, and socio-economic factors. The results are part of a nationwide statistical water use model for predicting water use.	$70,600
1996	City of Chandler	Reuse of Industrial	The City studied the cost and type of treatment necessary to	$50,000

Municipal and Industrial Conservation Programs				
		Process Water Study	recycle industrial process water and assessed the feasibility of its use in industrial and commercial cooling towers and on landscaping.	
2002	City of Mesa	Water Use It Wisely	This was ADWR's contribution to a valley wide media plan for water conservation. (Total funding was $733,000.)	$445,890
2007	SBW Consulting	RinseSmart: Low-water Use Pre-Rinse Spray Valves	This project intended to install 3,000 high-efficiency, pre-rinse spray valves in the Phoenix AMA outside of the services areas of the City of Phoenix and Salt River Project. *Note: $303,175 out of the $381,000 award was returned in December 2008 due to state budget shortfall.*	$77,825
				$1,530,813

Evaluation of Conservation Programs				
1994	Megecon	Arizona Corporation Commission Institutional Constraint Resolution	This project investigated institutional constraints between ADWR and the ACC and possible solutions, identified issues related to water conservation program cost-recovery, and provided recommendations for resolution of the issues.	$30,000
1994	University of Arizona	Evaluation of Non-Per Capita Conservation Programs	This grant helped municipal water providers in the Phoenix AMA measure water savings from existing conservation measures, determine key implementation factors, and evaluate the potential savings of proposed conservation programs.	$19,000
1994 1996	Arizona State Unversity Morrison Institutute	Evaluation of Water Conservation Measures	This grant provided the groundwork for an evaluation of conservation measures employed by water providers throughout the Phoenix AMA. The project included a literature search and an assessment of residential water conservation efforts. A quantitative model for evaluating the costs and benefits of conservation measures was developed for water providers.	$29,600 $62,000
2004	Amy Vickers	Water Conservation Consultation	Amy Vickers, nationally known author of "Water Use Conservation", provided consultant services to the Department.	$8,319
2007	University of Arizona Water Resources Research Center	Evaluation of the Management Plans	Dr. Sharon Megdal worked with Dr. Zachary Smith (NAU) to evaluate the effectiveness of the ADWR's five Management Plans in order to assist the Department with the development of the Fourth Management Plan.	$30,000
				$178,919

Monitoring and Planning				
2001	University of Texas	Predict Subsidence with Radar Interferometry	Radar interferograms were purchased and used to identify and monitor subsidence within the Phoenix and Tucson AMAs and to create predictive models of subsidence.	$36,842
2002	East Valley Water Forum (EVWF)	East Valley Area-wide Management Plans	This consortium of water providers developed an area-wide management plan that looked at existing infrastructure and resources, groundwater models, and future scenarios to develop a management plan based on "normal" supplies and recharge.	$282,000
2008	East Valley Water Forum (EVWF)	Impacts of Drought on Management Plans	The impacts of drought on the area-wide management plan is being examined using drought scenarios and groundwater models. *Note: $100,000 out of $150,000 was returned to ADWR in December 2008 due to the state budget shortfall*.	$50,000
				$368,842

Landscaping, Horticulture and Irrigation				
1993	Arizona Municipal Water Users Assn. (AMWUA)	Xeriscape™ Booklet	AMWUA created and distributed a Xeriscape booklet that provided colorful pictures of Xeriscape landscaping options and names of all the plants portrayed.	$25,000
1993	University of Arizona	Minimum Irrigation Requirements for Trees	This study identified the minimum irrigation requirements for three tree species common to urban landscapes in the Phoenix AMA, developed irrigation schedules for landscape professionals and homeowners and provided guidelines based on research. Two detailed brochures were produced.	$57,358
1994	Boyce Thompson Arboretum	Irrigation Requirements for Ground Covers	This project identified new ground covers with potential use in low and middle elevation landscapes of Arizona and quantified water use requirements for both new and currently used ground covers.	$11,558
1994	Desert Botanical Garden	Greywater Reuse and Impacts on Plants	This study determined the effect of graywater on the growth and performance of selected ornamental desert plant species. The project used graywater generated by the occupants of the Desert House, located at the Desert Botanical Garden in Phoenix.	$59,025
1994	Maricopa Cooperative Extension Office	Demonstration Garden Trail Guide and Signs	The Master Gardener Program in conjunction with the Maricopa County Extension Office created signs and a Trail Guide pamphlet for use at a demonstration garden and interpretive trail designed to illustrate efficient water use techniques for the Sonoran Desert. The site is located at the Extension Office.	$4,500
1994	Boyce Thompson Arboretum Interpretive Signs	Boyce Thompson Arboretum Interpretive Signs	Interpretive signs were created for a demonstration garden of low-water use plants. Topics include functionality of low-water use plants, water efficient landscapes, water harvesting, salts in water and soils, and designing water efficient gardens.	$20,000
1994	City of Mesa	Superstition Springs Botanical Walk	The City of Mesa enhanced the Botanical Walk at Superstition Springs Mall by developing a low-water use plant brochure, entry signs, desert region signs, plant identification signs, and a maintenance manual.	$15,000
1994	City of Tempe	Tempe Women's Club Park Xeriscape Demonstration Garden	A Xeriscape demonstration garden and interpretive signs were installed in an area that had already been in use as a storm water retention basin.	$20,000
1994 1997 1998	University of Arizona	AZMET Turf and Crop ET Data Collection and Dissemination	AZMET (Arizona Meteorological Network) monitoring stations were installed throughout the Phoenix AMA to provide real-time data on water requirements for turf via e-mail, fax and internet. The data is used by the public for lawn watering and by large industrial turf customers (primarily golf courses).	$10,400 $6,000 $8,710
1995	University of Arizona	Drip System Failures and Impacts	The causes of drip system failures in the Phoenix area were investigated and their horticultural and economic ramifications determined. Guidelines and techniques for the design, installation, maintenance and operation for drip irrigation were developed and promoted through educational materials (Guidelines for Landscape Drip Irrigation Systems) and workshops.	$117,969
1995	Desert Botanical Garden	Center for Desert Living	The Desert Botanical Garden increased public awareness of water conservation measures through its Center for Desert Living, the Garden's principle exhibit on the ornamental use of desert plants, desert horticulture and water and energy conservation strategies.	$50,945
1995	Arizona Nursery	ANA Plant of the	The Arizona Nursery Assn.developed an education program for	$50,750

1996 1997	Association	Month and Promotional Education	nursery personnel, a plant of the month program, a video available at nurseries in kiosks to assist in the education and promotion of low water use plants to the public, and radio promotion of the project.	$27,300 $30,000
1998	University of Arizona	Turf Edge Effect Study	This project used microlysimeters and meteorological monitoring to determine how much turf evapotranspiration (ET) is increased at the interface between turfed and surrounding desert landscapes (the "edge effect") and how this enhancement of ET changes with distance from the turf/desert interface	$67,196
1998	University of Arizona	Tolerance Levels of Grass Varieties to Long-Term Effluent Use	This project determined the tolerance levels of modern bermuda grass and perennial rye grass varieties (35 varieties of each grass) to long-term effluent use. The grasses were grown inside a greenhouse hydroponics system developed by the University using a synthetic effluent which matches that of Phoenix effluent.	$22,098
1998	Human Productivity Center and AMWUA	Xeriscape: Landscaping with Style in the Arizona Desert	Xeriscape design guides were developed and distributed to new home buyers and existing homeowners. Customized landscape templates were developed for new communities, along with workshops for residents, demonstration areas, and information about landscape and irrigation design, installation, and maintenance.	$367,000
2004	UA Arid Land Studies	Smart Irrigation Controllers	Three types of "smart" irrigation control devices were evaluated for their water savings benefits in residential settings for two years. Results showed the most decrease with the with the ET based controller compared to the temperature/humidity sensor and soil moisture sensor. *Note: TAMA contributed $20,000*	$11,000
				$981,809

Educational Programs and Workshops				
1992	Arizona Municipal Water Users Assn.(AMWUA)	Junior High School Water Conservation Curriculum	AMWUA contracted with Lynette, Fleming, PhD. to develop a junior high school water conservation curriculum, "Water in our Desert Community: Activities for Grades 6-9".	$35,000
1992; 1993	Alfred's Plumbing	Low Flow Plumbing Workshops for Students and Homeowners	Workshops demonstrating the installation and operation of low-flow plumbing fixtures for junior and senior high school students and homeowners were conducted by Mr. Alfred Eichenger of Alfred's Plumbing	$13,000 $13,000 $4,825
1993 1994 1995 1996 1998	Natural Resource Conservation Workshops for Arizona Youth (NRC WAY)	NRC WAY Natural Resource Workshops	This project provided tuition scholarships for high school students to attend the NRC WAY workshops which are held for one week each year. Topics covered in the annual workshop are ecology, geology, hydrology, anthropology and forestry. The Department also supplied volunteer instructors	$3,150 $3,975 $4,680 $4,680 $4,125
1996	Duncan Farms	Duncan Farms Teacher / Student Education Program and Booklet	The project consisted of designing and constructing an educational maze about water conservation, 2,000 water conservation education booklets for teachers and 30,000 water conservation children's activity sheets.	$12,000
1999 2000 2002 2004 2005	Kids View Communications	Bear Essential News for Kids	Bear Essential News included a monthly page about water conservation ("HydroSmarts" and "Discover the Waters" in their newspaper designed for children ages 6 to 13 and distributed to libraries, parks, pediatricians' offices, and family-oriented retail centers. *Note: funding was ~$30,000 per year*.	$150,000

Educational Programs and Workshops				
2002 - 2008	UA Water Resources Research Center (WRRC)	Arizona Project Wet—Water Education for Teachers	Arizona Project Wet provides workshops for teachers, water education materials for schools, and water festivals in the Phoenix AMA and around the State. In 2007, Arizona Project Wet developed Conserve Water AZ, a 336 page resource specifically about Arizona water sources, management, and conservation. *Note: $149,395 out of the $214,000 award was returned in December 2008 due to the state budget shortfall:*	$55,000 $500,380 $64,605
2002	UA Water Resourcees Research Center	Arizona Project Wet—Schools Water Festivals	Make-a-Splash Water Festivals meet 4th grade water education standards through interactive lessons about the water cycle, the value of water and conservation, watersheds, and ground water. *Note: funding was ~ $5,000 per year.*	$30,000
2003	UA Water Resourcees Research Center	Water Maze	Interactive educational displays were developed for loan to schools, libraries, parks, etc.	$10,000
2008	SRP	Water Management Display for CRWUA	Educational exhibit for the Colorado River Water Users Assn. conference.	$2,526
				$910,946

Total $8,500,000